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FINAL REPORT:

METALLICITY AND THE LEVEL OF
THE ULTRAVIOLET RISING BRANCH IN ELLIPTICAL GALAXIES

NASA Grant No. NAG 5-436

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This is a final report on "Metallicity and the Level of the UV Rising Branch in Elliptical Galaxies," NASA IUE Grant No. NAG 5-436. I submitted a lengthy status report through 12/31/85 which gave the status of the research at that time. This report is attached here for completeness. Since that time, we have made additional progress in three areas:

1) We have completely finished a full re-reduction of all IUE spectra of elliptical galaxies (some seventy in all) and placed them on a consistent, homogenous flux system. Our intent to do this was mentioned in the previous report, but the results are only now available. This aspect involved a great deal of labor by Professor Bertola and his graduate student, Lucio Buson, of the University of Padova.

2) The new spectra have been reanalyzed, and our previous correlation between UV flux and metallicity is improved still further. Fig. 1 shows our main observational result. Normal ellipticals with no active nuclei or star formation are shown as the blank squares. They trace out tight relation in which UV flux correlates closely with metal line strength (Mg_2). Active galaxies (open squares; strong nuclear emission as in M87) lie off this line, with slight UV flux excesses. Star-forming galaxies (crosses) are strongly deviant, owing to UV-bright young stars. The basic trend shown by the black squares, which we take to be typical of normal, quiescent galaxies, was considerably improved by the new reductions, which improved the accuracy and homogeneity of the UV flux calibration.

3) We now have the second draft of a lengthy paper, intended for the Ap.J. Suppl. Astrophysically the same question remains as in December: how to account for the trend among normal galaxies with any plausible model. Old stellar population models have a hard time quantitatively accounting for

a UV flux dependence on metallicity that is as strong as is observed. Young-star models have a hard time explaining any trend at all. Clearly the UV flux from present-day normal elliptical galaxies is still an enormous mystery. Moreover, this project alerts us to the probability that the UV fluxes of distant ellipticals -- a cornerstone of observational cosmology -- will likely be difficult to interpret indeed.

As of this writing, all our moneys have been spent except for funds liened to pay publication costs.